

STATUS REPORT
ON THE
CALTECH HEAVY ISOTOPE SPECTROMETER TELESCOPE (HIST) ON ICE
(NASA Grant NAG5-722)

1 December 1985 to 30 June 1986

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Progress on HIST data analysis during the reporting period is described below. An updated HIST bibliography is also enclosed.

Cosmic Ray Isotopes

An article entitled " ^3He in Galactic Cosmic Rays" was completed in January and submitted to the Astrophysical Journal. This article reports a new measurement of ^3He made with our ISEE-3 instrument, and it contains the results of new calculations of the expected $^3\text{He}/^4\text{He}$ ratio at 1 AU for a range of cosmic ray propagation models. Improved agreement is achieved among this and earlier satellite observations ($\sim 50 - 100$ MeV/nucleon), balloon data at somewhat higher energy ($\sim 100 - 300$ MeV/nucleon), and propagation and solar modulation models designed to describe the abundances of heavier cosmic rays ($Z = 3$ to 28). In particular, we find no evidence for an excess of ^3He such as might result from recent propagation models designed to explain the unexpectedly high antiproton flux in cosmic rays.

As an outgrowth of the above work on cosmic ray ^3He , a second paper was written and submitted to the Astrophysical Journal in collaboration with W. R. Webber of the University of New Hampshire and R. L. Golden of New Mexico State University. In this paper, "A Re-Examination of the Cosmic Ray Helium Spectrum and the $^3\text{He}/^4\text{He}$ Ratio at High Energies", we re-examined the interpretation of a recent measurement by Jordan and Meyer which found an excess of ^3He at high energy (~ 6 GeV/nucleon), and attempted to reconcile this observation with low-energy ^3He measurements (such as our ISEE-3 measurement), and with cosmic ray propagation models. Based on a new measurement of the high energy He spectrum, and a compilation of earlier measurements, we concluded that the Jordan and Meyer measurement should be revised downward, and that it was then consistent with lower energy satellite and balloon observations.

Work is proceeding on a third paper that combines 1 AU and Voyager data in an effort to deduce the spectrum of anomalous ^4He after the reversal of the solar magnetic field in 1980.

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ABSTRACTS/TALKS

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